

Serial No. 09/910,497  
Response dated January 3, 2006  
Reply to Office Action of October 3, 2005

Docket No.: 290397.0007  
(97541.00007)

### Remarks

Claims 5 and 14-26 were previously cancelled. Claims 30-39 were previously withdrawn. Accordingly, claims 1-4, 6-13, 27-29 and 40-50 are currently pending.

Claims 1-4, 6-13, 27-29 and 40-50 stand rejected under 35 U.S.C. § 112 as failing to comply with the written description requirement. Claims 1-4, 6-13, 27-29 and 40-50 also stand rejected under 35 U.S.C. § 102(b) as being anticipated by Evans, WO 96/37570. Claims 1, 3, 4, 27-29, 40, 42 and 43 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting in view of copending application publication no. US 2002/0171063 A1. Claims 1-4, 6-13, 27-29, and 40-50 also stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting in view of copending application publication no. US 2002/0020828 A1.

Claim 1 has been amended to recite in the preamble that the heat transfer fluid of the present invention has an operating range with a lower temperature limit that is below minus 10°C at atmospheric pressure and an upper temperature limit that is above 150°C at atmospheric pressure. Claims 1, 27 and 43 have been amended to recite that ethylene glycol comprises between greater than 60 percent to about 70 percent ethylene glycol relative to the total weight of diols in the heat transfer fluid. As discussed in detail below, the amendments are fully supported in the specification, and no new matter is added.

As recited in claims 1-4, 6-13, 27-29 and 40-50 as amended, the present application is directed to a non-aqueous heat transfer fluid having reduced toxicity and methods for reducing the toxicity of ethylene glycol based heat transfer fluids. As set forth in claim 1 as

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amended, the heat transfer fluid comprises between greater than 60 percent by weight and about 70 percent by weight (of the total weight of diols in the fluid) ethylene glycol, at least one additional diol which acts as an inhibitor for ethylene glycol poisoning, and at least one corrosion inhibitor additive that is soluble in ethylene glycol and the additional diol. This is supported in the specification at, for example, page 14, line 21 to page 15, line 5 (paragraph 00049 of the published application) where a preferred embodiment of the fluid containing ethylene glycol in any amount ranging between 0 percent and about 70 percent by weight is described.

The preamble of claim 1 has been amended to recite that the heat transfer fluid has an operating range with a lower temperature limit that is below minus 10°C at atmospheric pressure and an upper temperature limit that is above 150°C at atmospheric pressure. This amendment is supported in the specification at, for example, page 15, line 19 to page 17, line 16 (paragraphs 00053-00055 of the published application), which describe the freezing and boiling points of neat ethylene glycol, neat propylene glycol, and the fluid mixtures contemplated by the present invention. All of the freezing points described are below minus 10°C, and all of the boiling points are above 150°C.

As further recited in claim 1 as amended, the heat transfer fluid contains no additives that require water to be present in the fluid to dissolve the additives or to otherwise enable the additives to function. Claims 2-4 and 6-13 depend, directly or indirectly, from claim 1 and further define embodiments of the invention. As set forth in claims 4 and 13, in one embodiment, the additional diol that acts as an inhibitor for ethylene glycol poisoning is propylene glycol.

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As recited in claims 27-29 and claims 40-50 as amended, the present application is also directed to methods for reducing the toxicity of existing ethylene glycol based fluids by adding a second diol, such as propylene glycol, which reduces the toxicity of the ethylene glycol based fluid. As recited in claims 27 and 43 as amended, after addition of the second diol, the resulting heat transfer fluid contains between greater than 60 percent and about 70 percent by weight (of the total weight of diols in the fluid) ethylene glycol. This is supported in the specification at, for example, page 14, line 21 to page 15, line 5 (paragraph 00049 of the published application).

As described in the specification at, inter alia, pages 11 and 14-15 and as recited in the amended claims, the heat transfer fluid of the present invention is used as a coolant without the addition of any water. As described in the specification at, inter alia, pages 15-17, the heat transfer fluids of the mixtures described and claimed in the present application exhibit the necessary physical properties, such as, for example, viscosity and vapor pressure, to function effectively in applications over a broad range of temperatures. The diols in the heat transfer fluid recited in the amended claims serve as the heat transfer medium. Thus, the freezing point of the heat transfer medium is determined by the freezing point of the diols, and the boiling point of the heat transfer medium is determined by the boiling point of the diols.

The heat transfer fluid recited in the amended claims is non-aqueous, meaning that water is not added or intended to be added to the fluid. Any water that is present is an impurity and would be present in very small amounts. Any such water would typically be removed from the fluid in use when the fluid is heated, as in an engine, because the water would be converted to vapor and vented from the system. Because water may only be present

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in very small amounts as an impurity, any water present in the fluid is insufficient to cause corrosion, and there is no need to include additives to prevent water-caused corrosion of internal surfaces, i.e. no inhibitors requiring water to remain in solution are necessary.

As set forth in the present application at pages 11 and 21, the only additives present in the heat transfer fluid of the present invention are completely soluble in the diols without the presence of any water. These additives remain dissolved in the fluid regardless of storage or use. The heat transfer fluids do not contain any additives that require water to be present to dissolve the additives or to otherwise enable the additives to function. As described in the specification at pages 7-9, prior art glycol based heat transfer concentrates required from 3% to 5% by weight water to dissolve additives that need water for solubility, such as metasilicate corrosion inhibitors. Even with 3% to 5% water, the water-requiring additives would often precipitate out of solution during storage of the concentrate, and if enough additional water were not added to the concentrate to form the heat transfer fluid, the water-requiring additives would precipitate or gel during use at elevated temperatures.

Moreover, as described in the specification at, inter alia, pages 18-21, the non-aqueous heat transfer fluids of the present invention unexpectedly exhibit a reduced oral toxicity than would be predicted based upon the oral toxicity of the major components, such as ethylene glycol or propylene glycol.

#### **Rejections Under 35 U.S.C. § 112**

In the October 3, 2005 Office Action ("the Office Action"), the Examiner has rejected claims 1-4, 6-13, 27-29 and 40-50 for failing to comply with the written description requirement. The Examiner first states that the amendment to the preamble stating that the

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fluid has "a freezing point at atmospheric pressure of less than minus 10°C and a boiling point at atmospheric pressure of greater than 150°C" is not supported in the specification. The preamble to claim 1 has been amended to recite that the heat transfer fluid has an operating range of with a lower temperature limit that is below minus 10°C at atmospheric pressure and an upper temperature limit that is above 150°C at atmospheric pressure. This operating range is supported in the specification as filed. All of the fluids described in the specification have freezing points that are below minus 10°C, and all of the boiling points are above 150°C. Thus, the fluid described in the specification necessarily operates in the recited temperature ranges, and the ranges are supported by the specification as filed. Moreover, the boiling point limitation of greater than 150°C was recited in claims 1 and 14 as filed, and therefore was explicitly recited in the specification as filed.

The Examiner also rejected claims 1, 27 and 43 under 35 U.S.C. §112 on the grounds that the specification does not support claims to a fluid having greater than about 70 percent by weight ethylene glycol. Applicants note that claim 1 of the application as filed disclosed a heat transfer fluid without the limitation of 70 percent by weight ethylene glycol described in the preferred embodiments of the invention in the specification.

As discussed above, the current amendments to the claims are fully supported by the specification. Accordingly, the amendments to claims 1-4, 6-13, 27-29 and 40-50 overcome the rejection of the claims under 35 U.S.C. §112.

**Rejection Under 35 U.S.C. §102**

The Examiner has also rejected claims 1-4, 6-12, 27-29 and 40-50 under 35 U.S.C. §102(b) as being anticipated by Evans, WO 96/37570. Evans describes a non-aqueous heat

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transfer fluid preferably comprised of propylene glycol as the only glycol present in the fluid. WO 96/37570 at page 16, lines 5-7. Although Evans states that the fluid may contain ethylene glycol in addition to propylene glycol, Evans also states that the fluid must contain at least 40% by weight propylene glycol to the heat transfer fluid's characteristics and to avoid increased toxicity. WO 96/37570 at page 16, lines 7-14. All of the heat transfer fluids described and claimed in WO 96/37570 contain at least 40% by weight propylene glycol. The heat transfer fluids described in WO 96/37570 that contain ethylene glycol all contain less than 60% by weight ethylene glycol.

In the present application, the inventors unexpectedly discovered that an ethylene glycol based, non-aqueous heat transfer fluid could be substantially reduced in toxicity by addition of propylene glycol at concentrations of less than 40% propylene glycol, and that such a heat transfer fluid would function satisfactorily. The claims as amended recite that the heat transfer fluid must contain more than 60% by weight ethylene glycol, meaning the second diol, such as propylene glycol, must comprise less than 40% by weight of the non-aqueous heat transfer fluid. Because the claims as amended require more than 60% by weight ethylene glycol, the heat transfer fluid recited in the claims as amended is not the same as the heat transfer fluid described in WO 96/37570.

In order to anticipate a claim under 35 U.S.C. § 102, all of the limitations of the claim must be disclosed in a single prior art reference. MPEP § 2131; *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). Claims 1-4, 6-13, 27-29 and 40-50 as amended recite that the heat transfer fluid must contain greater than 60% by weight ethylene glycol relative to the total weight of diols in the fluid. Accordingly, the heat transfer fluid

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recited in the claims as amended necessarily contains less than 40% of a second diol such as propylene glycol. As set forth in detail above, WO 96/37570 does not describe a non-aqueous fluid containing greater than 60% ethylene glycol. Therefore, WO 96/37570 does not describe a fluid meeting each and every limitation of the fluid recited in the claims as amended. Accordingly, WO 96/37570 does not anticipate the amended claims under 35 U.S.C. §102(b).

#### **Double Patenting Rejections**

The Examiner has provisionally rejected claims 1, 3, 4, 27-29, 40, 42 and 43 under the judicially created doctrine of obviousness-type double patenting over the claims of copending Application No. US2002/0171063 and Application No. 2002/0020828. These applications both describe aqueous fluids comprising ethylene glycol and propylene glycol. Aqueous heat transfer fluids are different from non-aqueous heat transfer fluids such as the heat transfer fluids recited in claims 1-4, 6-13, 27-29 and 40-50 of the present application. It would not be obvious to one skilled in the art to modify the aqueous heat transfer fluids of the cited applications by removing water to create the non-aqueous heat transfer fluids recited in the amended claims of the present application. Indeed, because the heat transfer fluids in the cited applications contain water, the fluids must contain water soluble additives, unlike the heat transfer fluids recited in the amended claims.

While the applicants maintain that claims 1, 3, 4, 27-29, 40, 42 and 43 are not obvious over the claims of copending Application No. US2002/0171063 and Application No. 2002/0020828, applicants will file a terminal disclaimer to expedite prosecution of this application if this is the sole remaining grounds for rejection.

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The Examiner has also stated that claims 1-4, 6-13, 27-29 and 40-50 are provisionally rejected as being unpatentable over the claims of copending Application No. 2002/0020828. Applicants believe that there is a typographical error, and that the Examiner may have intended to cite copending Application No. 2003/0071242. To the extent that the Examiner intended to cite Application No. 2002/0020828, as discussed above, the applicant maintains that the cited Application No. 2002/0020828 directed to aqueous heat transfer fluids does not render the non-aqueous heat transfer fluids of the present invention obvious, but the applicant will file a terminal disclaimer to expedite prosecution of this application if this is the sole remaining grounds for rejection.

To the extent that the Examiner intended to cite Application No. 2003/0071242, while applicants maintain that amended claims 1-4, 6-13, 27-29 and 40-50 of the present application are not obvious in view of the claims of Application No. 2003/0071242, to expedite prosecution of the instant application, applicants will agree to file a terminal disclaimer if this is the sole remaining grounds for rejection.

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes after considering these remarks, that the application is not in condition for allowance, and in particular if a terminal disclaimer is required for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

Because the reasons above are sufficient to traverse the rejection, Applicants have not explored, nor do they now present, other possible reasons for traversing such rejections.



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Nonetheless, Applicants expressly reserve the right to do so, if appropriate, in response to any future Office Action.

No fee is believed to be required. However, if a fee is required or otherwise necessary to cover any deficiency in fees previously paid, authorization is hereby given to charge our Deposit Account No. 50-3569.

Respectfully submitted,

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